

The Economic Impact of South Carolina's Automotive Cluster



Developed by:

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Executive Summary

Over the last thirty years, South Carolina has developed a flourishing, globally competitive automotive and ground transportation cluster. In 2011, it is a major engine of economic growth in the state. This executive summary highlights the results of an in-depth, comprehensive economic study of South Carolina's automotive and ground transportation cluster (hereafter referred to as the auto cluster). Economists in the Division of Research, Moore School of Business at the University of South Carolina completed this research in early 2011. For the first time, this study reveals the depth and breadth of the economic effects in the Palmetto State that are tied to the auto cluster.

The study shows that the auto cluster plays a *unique role* in economic development. Notably, few other sectors of the economy have the real potential to scale up employment, which is the most pressing economic imperative in South Carolina today.

Automotive and ground transportation-related

businesses contribute to *approximately 5.4 percent of the state's employment base*, according to 2008 data compiled by the Division of Research. Importantly, the employment multipliers for each job created in South Carolina are unparalleled. For the automotive-related sectors examined in this study, the *job impacts are higher than any other specific sector or industry*.

Significant investments in the automotive and ground transportation industry began in 1973 with the establishment of Michelin's first United States production location and its suppliers. Nevertheless, decades earlier, the Anderson Motor Company began manufacturing two types of vehicles, making it the first South Carolina auto related manufacturer, even though it closed its doors in 1926 (Pfingsten, 2009). Michelin has since established its North American



headquarters in South Carolina. Another important auto related manufacturer, Bosch, began operating in South Carolina in 1974, producing injection systems for diesel engines (Schmitt, 2008). Both domestic- and foreign-owned companies and original equipment manufacturers (OEMs) such as Daimler, Honda, and Road Rescue have created a presence in the state. In 1993, BMW built its first full manufacturing facility outside of Germany and its only plant in North America at the time. Today, these companies and many more contribute significantly to South Carolina's employment and income.



The automotive and transportation businesses identified in South Carolina are mostly engaged in manufacturing. They are final goods assemblers and suppliers. Yet they are linked to a larger network of businesses, which together generate a substantial economic impact in South Carolina. It is this wider network that forms the total auto cluster. A growing research and development dimension in the state will strengthen the cluster over the long run.

The cluster has an immense economic footprint in the state. Overall, according to the latest available data (2008), the study finds there are 314 manufacturing establishments, plus another 4 non-manufacturing establishments engaged in research, logistics, or wholesale in the auto cluster of South Carolina. Thousands of establishments—from textiles and electronics to business services--owe part of their business activity to the automotive manufacturers' widespread presence in the state.

Overall, the auto cluster in South Carolina engenders a total economic impact of \$27.1 billion (2008) through the knock-on effect of spending by the manufacturers (assemblers and

suppliers). This metric, the broadest measure that defines the auto cluster in the state, is the basis for the employment generation emphasized in the study. Through the economic ripple effect of in-state spending by assemblers and suppliers, the auto cluster supports *84,935 full-time equivalent jobs in South Carolina, or 5.4 percent of the state employment base (2008)*.

The study buttresses the argument that South Carolina should focus strategically on attracting and retaining automotive manufacturers. Among the striking facts uncovered in the research are the following:

- The automotive/ground transportation cluster is the state's leading job machine, with automotive manufacturers exhibiting higher employment multipliers than any other industry. The highest job multiplier in the state is found for Military Vehicles Manufacturing (5.5); that is, there are 5.5 jobs total for every one direct job. These employment impacts reflect the ratio of total jobs supported in South Carolina to direct jobs in the establishment. In other words, a direct job supports an additional 4.5 jobs through multiplier effects.
- The next highest employment multipliers for South Carolina are also automotive and transportation manufacturers: Light Truck Manufacturing (4.6), and Automotive Manufacturing (4.1). Heavy Duty Truck Manufacturing also ranks in the top five job impacts. Again, these employment impacts reflect the ratio of total jobs supported in South Carolina to direct jobs in an establishment. It can be said that each direct job in Light Truck Manufacturing supports an additional 3.6 jobs and Automotive Manufacturing supports additional 3.1 jobs in South Carolina. These manufacturing industries have a great potential to create many direct jobs, so the aggregate impact on employment can be enormous.

- The average automotive manufacturing multipliers, including assemblers and suppliers, are more than 1.5 times greater than the South Carolina industry average.
- The ten counties with the highest auto employment are major metropolitan counties such as Greenville, Charleston, Berkeley, Spartanburg, York, Aiken, Florence, Richland, and Lexington. Greenwood has an especially high concentration of employment in automotive and related sectors, although it is not a major urban area.
- The automotive and transport industries boast some of the highest dollar impacts for economic activity as measured by contributions to state economic activity. Besides employment, the most important impacts arise through value added: the dollar value representing the overall contribution to the state economy. Automotive and ground transportation are shown to have the top five highest value added multipliers in the state: Heavy Duty Truck Manufacturing, Light Truck and Utility Vehicle Manufacturing, Military Vehicles, Truck Trailers, and Automobile Manufacturing. For each dollar of value creation in the factories of these industries, \$1.58 to \$2.07 more will be generated in additional economic activity (value added) for other businesses.
- Research and development plays a significant role in the South Carolina automotive/ground transportation cluster. Notably, large manufacturers like Michelin have separate research facilities and devote approximately thirteen percent of their workforce exclusively to research on durability, fuel efficiency, and safety. This commitment to research and development makes the auto cluster in South Carolina more attractive to companies considering relocating in South Carolina. The study also stresses the pivotal role that the Clemson University International Center for Automotive Research (CU-ICAR) has in cultivating an innovative automotive cluster in South Carolina.

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Section I – Introduction

The South Carolina economy is recovering from the Great Recession that began in December 2007. Though most indicators suggest that the economy stabilized during 2010, the recession took its toll on all major industries in South Carolina and substantially reduced total employment, real personal income, and a host of other variables that measure the economic health of South Carolina. During the recovery, it is more important than ever to determine the sectors in South Carolina that contribute most to its overall economic health and to support the continued growth of these sectors.

While the pace of automotive global sales growth has been sluggish during the recession, the future looks auspicious. Analysts predict a rise in sales by 22 percent by the year 2020 (Boston Consulting Group, 2010). United States, Japan and Western Europe will continue to dominate demand, with a projected 40 percent of the global sales. Developing countries such as China, Brazil, and India will witness rapidly increasing demand.

South Carolina's automotive and ground transportation cluster (the automotive cluster) is poised to take advantage of this growth. The South Carolina automotive cluster began in the early 1900s when Milliken & Company began making fabric seats and roofs for Henry Ford's automobiles. Since the 1950s, the automotive cluster has gained momentum in South Carolina and in 1973 gained Michelin's North American headquarters, which produces approximately one-third of its total tire sales and contains an independent research and development facility that employs over 1,000 workers. Soon after, Bosch began production of injection systems, employing over 2000 workers in Anderson, Charleston, and Fountain Inn. This was followed by BMW's decision to locate its first and only North American assembly plant in South Carolina in 1992. It is important to recognize that while these additions were significant, they do not tell the

whole story. The automotive cluster that has developed around these major companies encompasses a wide range of suppliers and businesses that contribute to South Carolina's economy.

When combining the impact of the large automotive manufacturers and the accompanying supplier network, the automotive cluster in South Carolina today is not only one of the largest sectors of the economy, but is also a sector that has unparalleled returns on employment, has among the highest economic impacts with respect to the dollar value of its contributions to South Carolina's economy, and demonstrates a commitment to research and development that makes it attractive to companies outside the state. In 2011, job creation is critically important to South Carolina's economic recovery. Because of the automotive cluster's significant contributions to the state's current employment base as well as its high returns on employment, this sector of South Carolina's economy is a focal point for future economic growth. This report provides a detailed account of the South Carolina automotive cluster – its components, its industries, and its significant overall economic impact that is measured in a variety of ways.

The remainder of this report is organized as follows: Section II outlines the locations, components, and distribution of the auto cluster in South Carolina; Section III provides a detailed analysis of the economic impact of the South Carolina auto cluster; Section IV highlights the commitment the South Carolina auto cluster has to research and development; Section V concludes.

Section II – Economic Footprint

Methods

The automotive manufacturing cluster was constructed based on the latest National Establishment Time-Series (NETS) database. Through careful study of previous research, several auto-manufacturing related industries were included to identify the central portion of the cluster. These industries include the major assemblers and their components, which have grouped into the first “tier” of the cluster. Secondly, multiplier analysis was used to identify even further upstream industries that are related to automotive manufacturing. These upstream industries, such as glass manufacturing, advanced textiles, and electronics were grouped into the second tier of the cluster. While these industries may not solely contribute to automotive manufacturing, their ties are strong and their production is closely related to automotive manufacturing. The tier definitions are located in Appendix C.

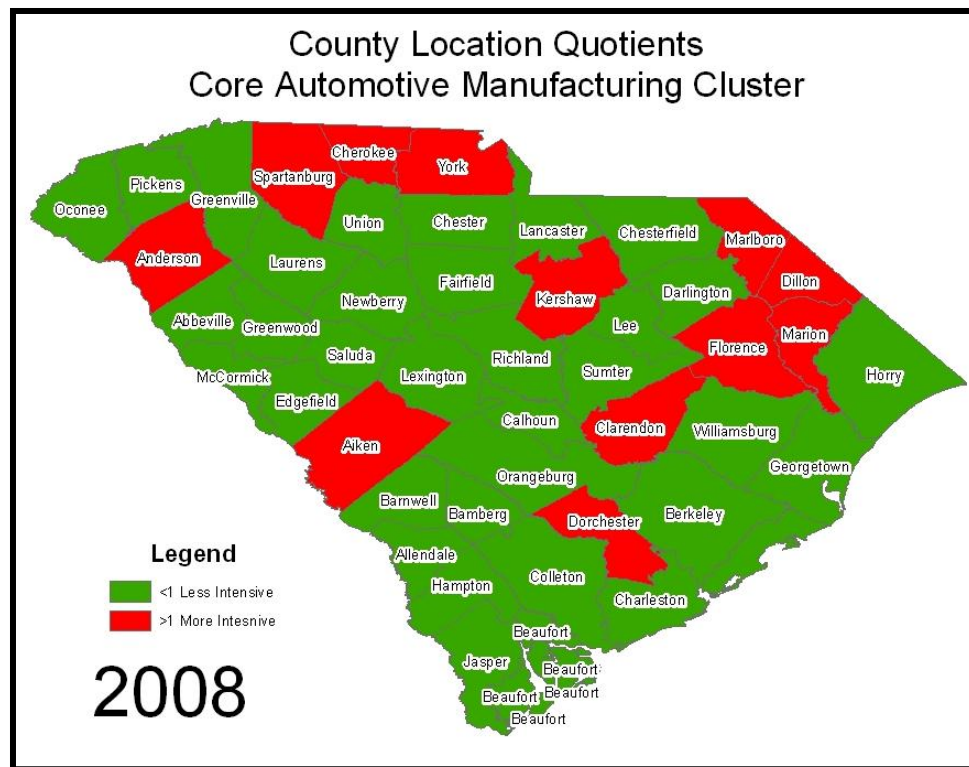
Locations

Industries identified to belong to the automotive manufacturing cluster were extracted from the NETS database, and supplemented from previous research from the SC Department of Commerce to form a database of establishments in South Carolina’s Automotive manufacturing cluster. The NETS database contains information from South Carolina businesses dating back to 1990, including employment, sales, and industry identification. The database contains 12 establishments that assemble vehicles, also called Original Equipment Manufacturers (OEM’s). The core automotive manufacturing cluster also encompasses (mostly first-tier) suppliers. There are 309 core supplier firms. The larger automotive cluster includes the second tier suppliers who do not directly sell to OEMS. This larger supplier set contains over 4,600 firms. As seen in

Figure 1 in Appendix A, the core cluster (OEMS and first tier, major manufacturing suppliers) have formed in distinct regional clusters near the Spartanburg and Charleston metro areas.

Figure 2: County Location Quotients

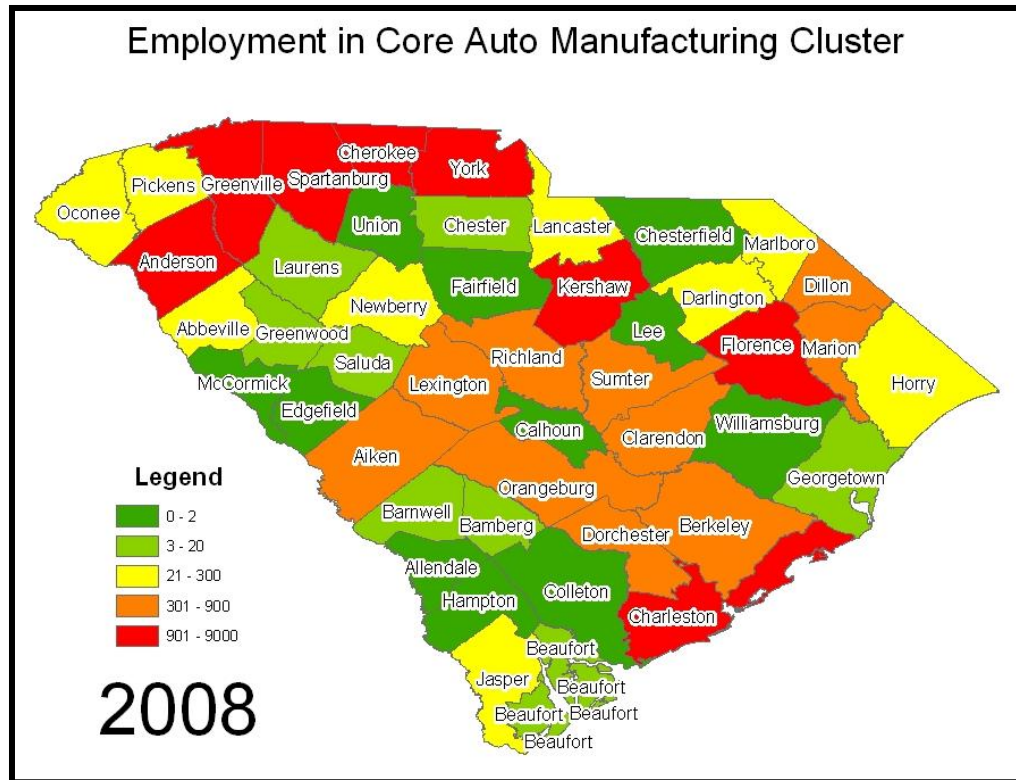
See Table 1 in Appendix B



Source: Division of Research, based on NETS data

The map above (Figure 2) depicts county automotive employment intensity. In this map, the county automotive manufacturing intensity is measured by location quotients: the share of county core auto cluster employment in the state relative to the county's share of total state employment. If the ratio of these two shares (the location quotient) is greater than one (shown in red), the county has developed an automotive-intensive economic base; that is, a higher share of state core automotive employment than would be expected, given the county's share of overall state employment.

Figure 3: County Employment



See Table 1 in Appendix B. Employment is broken into intervals based on quintiles.

Some counties have especially high levels of employment concentration, as Figure 3 indicates. The counties surrounding the BMW plants in Spartanburg county have high amounts of employment concentration, including Anderson and Cherokee counties. A few smaller counties, including Kershaw, Marlboro, Dillon, and Clarendon counties have employment levels of 3-5% in automotive manufacturing. The concentration of employment is an indicator of a developing industrial cluster.

Employment and Sales

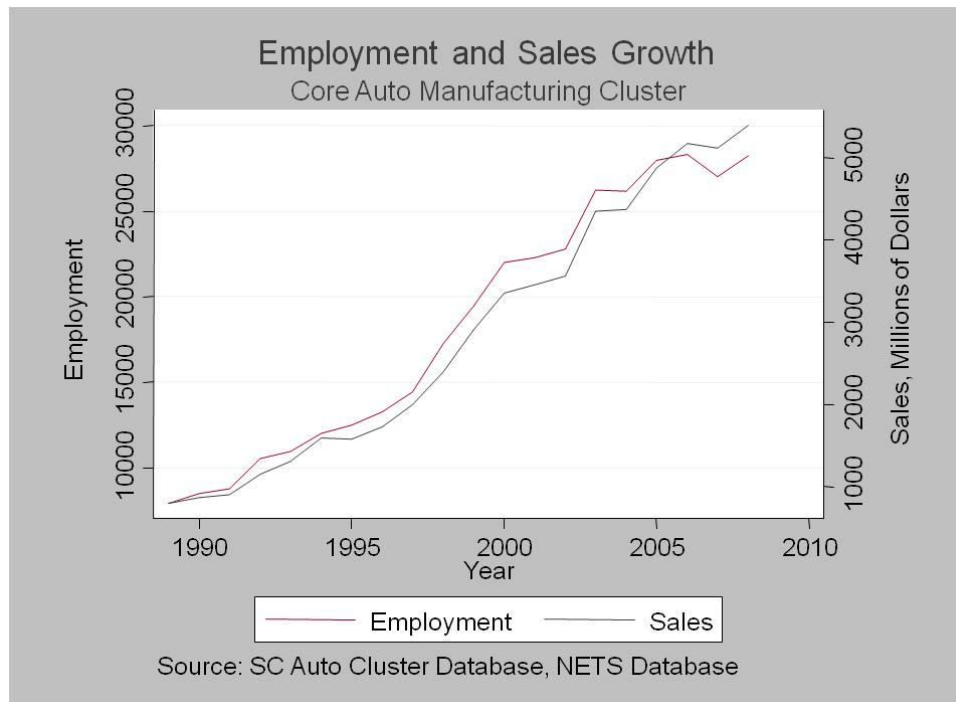
Table 2: Employment and Sales

SOURCE: DIVISION OF RESEARCH, BASED ON NETS DATA.

	Establishments	Total Employment	Average Employment	Total Sales	Average Sales
OEMs	12	8,832	736	1,590,000,000	132,600,000
Core Suppliers	307	21,062	72	4,110,000,000	14,040,557
Wider Cluster – related Businesses	4,645	129,040	28	21,400,000,000	4,598,921
Total	4,964	158,934		27,100,000,000	

As Table 2 illustrates, the entire cluster, including core cluster and along with second-tier suppliers and other related businesses, employs 158,934 people. The core cluster – assemblers and suppliers – together employ 28,268 people. The automotive assemblers employ, on average, over 700 at each establishment. Component manufacturers and core manufacturing supplier establishments, on average, employ workforces of greater than 70 workers. Sales at these establishments total to over 27 billion dollars, with close to 6 billion in sales at the OEMs and core suppliers. On average, the assemblers have much higher sales than component suppliers, who, in turn, have much higher sales than suppliers even further upstream (included in the wider cluster). Furthermore, as indicated in Figure 4 below, both employment and sales have tripled in the past twenty years.

Figure 4: Total Employment and Sales Growth



Spartanburg tops the list of counties in terms of employment and sales in 2008, due mostly to the two BMW plants located in the county. In employment, the top three counties are clustered around Spartanburg and its OEM and major suppliers. In sales, however, Charleston County is second highest, owing in large part to a major military vehicle OEM, Force Protection, and American La France’s emergency vehicle manufacturing establishments. A full table of counties and their total employment and sales is available in Appendix B.

Section III – Assessing the Impact of South Carolina’s Automotive Cluster

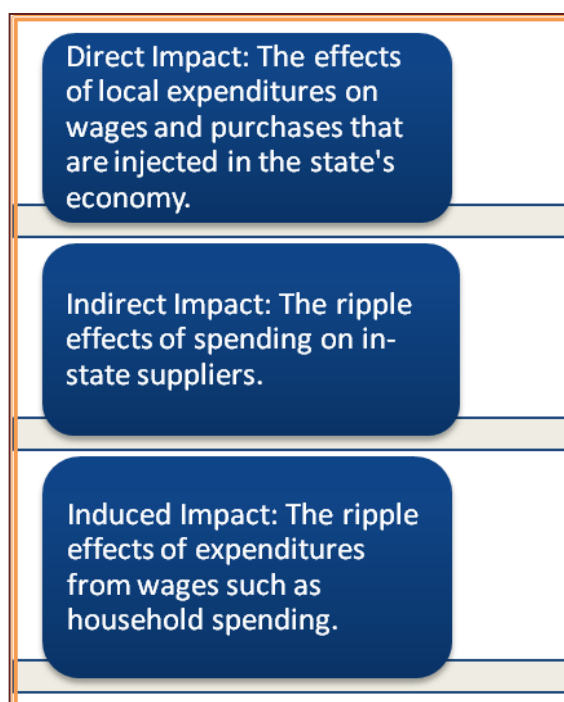
Methods

The South Carolina automotive cluster directly employs thousands of people and generates billions in output each year. These expenditures generate even further employment and output via an economic multiplier effect. These effects are associated with the cluster, though

not directly contributed by businesses in the cluster. These multiplier effects nearly triple employment, mirroring the supplier relationships within the cluster that center on OEMs.

The multiplier effects can be divided between the direct impacts, the indirect impacts, and the induced impacts. The direct impact is the economic activity generated by the firms in the cluster spending on local supplies and wages. These local purchases generate further expenditures within South Carolina and other state economies, leading to indirect impacts. When automotive parts suppliers spend the income earned from purchases from the OEMs and other final assemblers, even more upstream suppliers are benefited. Furthermore, wages earned by employees in the direct employment in the cluster and employment generated in those upstream suppliers increases local consumption of goods and services. The effects on local consumption are called induced impacts. The sum of all of these- direct, indirect, and induced- is the total economic impact.

To begin the impact analysis, information on the employment and sales of establishments within the cluster was gathered from the NETS database, a comprehensive database of firms in South Carolina. This database was further employed to tabulate the direct effects by economic sector.



Given these estimates of employment and sales of establishments in the automotive cluster, the multiplier impacts on the state were calculated using the IMPLAN model, a form of input-output analysis widely used across the United States. The impacts generated by IMPLAN

produce the indirect and induced effects. In tailoring the IMPLAN model for the automotive cluster, every attempt was made to gauge the effects with accuracy, using conservative assumptions.

IMPLAN's input-output model accounts for the linkages—including intermediate inputs and final consumer demand — that characterize the inner working of state economies. IMPLAN has information for 508 industrial sectors (industries) that comprise the U.S. economy. It is a highly complex and detailed set of equations that accounts for all industry purchases of commodities, services, employee compensation, value added, and imports, which are in turn set equal to the value of the commodities produced in the state. Purchases for final use (final demand) drive the model. In this study, we measured the in-state expenditures of establishments in the automotive cluster.

Three major economic impacts were assessed:

- **Total Impact (or Output).** This is the contribution to overall economic activity. It measures the annual value of goods and services associated with auto-manufacturing business activities.
- **Value Added:** This is net contribution to the state's economy. It is similar to gross domestic product for the state.
- **Employment.** This is the total number of jobs associated with the measured economic activities associated with automotive manufacturing.

Results

This section contains the major results of the study. The following tables provide impact estimates for the Automotive manufacturing cluster in the entire state, though its economic contribution is concentration in some specific areas throughout the state's geography.

As shown in the Table 3, the automotive manufacturing cluster direct employment and spending have a total economic impact (or Output effect) of \$27 billion across South Carolina (2008). This level of economic activity supports a total of 84,935 jobs. Note again that this represents the value of all goods and services associated with the Auto-Manufacturing Cluster and its cascading influence across the state.

Table 3: Economic Impact in South Carolina

	Value Added	Output	Employment
Direct	\$ 9,469,427,827.25	\$ 19,435,103,176.78	29,844
Indirect	\$ 3,822,786,732.69	\$ 4,471,439,719.46	26,774
Induced	\$ 2,567,217,123.83	\$ 3,144,963,279.05	28,317
Total	\$ 15,859,431,683.77	\$ 27,051,506,175.29	84,935

From these impacts, the total employment contribution of automotive manufacturing in South Carolina is 5.4% of the total South Carolina employment in 2008. In some areas of the state, this percentage would likely be even higher given the high concentration of direct employment in automotive manufacturing. This fact, coupled with the high multipliers associated with automotive manufacturing, indicate a strong potential to create more long-term, high paying jobs.

Economic Impact Potential

Industries contained in the core of manufacturing and automotive parts manufacturing have the potential to create many more jobs than they directly employ. For example, for every one person that an automotive manufacturer employs, the economy will gain an additional three jobs. Table 4 contains the various employment multipliers for the industries contained in the core of the automotive manufacturing cluster.

Table 4: Automotive Manufacturing Component Industry Employment and Value Added Multipliers

Source: IMPLAN 2008

Automotive Manufacturing Cluster Component Industry	Total Employment Multiplier	Total Value Added Multiplier
Automobile manufacturing	4.09	2.58
Light truck and utility vehicle manufacturing	4.59	2.74
Heavy duty truck manufacturing	3.01	3.07
Motor vehicle body manufacturing	2.26	1.92
Truck trailer manufacturing	1.93	2.64
Motor home manufacturing	1.90	2.37
Travel trailer and camper manufacturing	2.10	2.17
Motor vehicle parts manufacturing	2.38	2.21
Military armored vehicle, tank, and tank component manufacturing	5.52	2.67

Value added is similarly high for all of the industries in the cluster, especially for truck and automobile assemblers. For each dollar in value added, which is similar to state gross domestic product, the automotive cluster will generate between one and two more dollars, essentially doubling to tripling the investment.

When comparing automotive manufacturing to other top South Carolina industries, the automotive manufacturing has some of the highest multipliers. Table 5 shows the top industries in South Carolina by employment according to the 2008 IMPLAN model for the state economy. Of these industries, automotive manufacturing, especially the final assemblers, ranks among the highest for employment multipliers (see shaded areas).

Table 5: Top South Carolina Industry Employment Multipliers

Source: IMPLAN 2008

Automotive Manufacturing Cluster Component Industry	Employment Multiplier	Automotive Manufacturing Cluster Component Industry	Employment Multiplier
Military armored vehicle, tank, and tank component manufacturing	5.52	Construction of new residential permanent site single- and multi-family structures	1.86
Light truck and utility vehicle manufacturing	4.59	Museums, historical sites, zoos, and parks	1.74
Automobile manufacturing	4.09	Accounting, tax preparation, bookkeeping, and payroll services	1.61
Heavy duty truck manufacturing	3.01	Hotels and motels, including casino hotels	1.49
Extraction of oil and natural gas	2.97	Cotton farming	1.42
Motor vehicle parts manufacturing	2.38	Real estate establishments	1.39
Motor vehicle body manufacturing	2.26	Warehousing and storage	1.37
Electric power generation, transmission, and distribution	2.19	Investigation and security services	1.32
Travel trailer and camper manufacturing	2.10	Employment services	1.26
Truck trailer manufacturing	1.93	Fitness and recreational sports centers	1.26
Motor home manufacturing	1.90	Retail Stores - Miscellaneous	1.22
Broadwoven fabric mills	1.89	Tobacco farming	1.21

Section IV – Research and Development

For a cluster to sustain its competitive advantage, pure manufacturing prowess is insufficient. An emphasis on research, innovation and technological advancement is necessary to sustain this advantage in the long term. Companies must invest in improving their products, processes and productivity at all times. This is especially true for the automotive industry in which less than 1% of funding for R&D comes from the Federal government (Economics and Business Group, 2010).

R & D activities in South Carolina received a boost when Clemson University set up the International Center of Automotive Research (CU-ICAR) 7 years ago in Greenville. The research park is a public-private partnership and companies like BMW, Koyo Bearings USA have set up research centers (Clemson, 2010), creating 500 jobs. Ongoing research includes working with Michelin in the development of “TWEELS”, an experimental tire design that does not need air. Students at ICAR also rolled out the prototype “Deep Orange”, a hybrid vehicle built by collaborating with companies like BMW, FEV, Dell and Michelin.

Initiatives such as these are attracting more investment. German transmission maker, ZF group is investing \$350 million in building a transmissions plant in Laurens county, creating 900 new jobs by 2012. In April 2010, Proterra Inc., which assembles drive and energy storage systems for heavy-duty vehicles, announced plans to locate an R & D and manufacturing facility at CU-ICAR Research Park. Proterra anticipates that it will invest \$68 million and create 1,300 new jobs over the next seven years. American Titanium works is locating its development and engineering center at ICAR, in connection with a \$422 million titanium mini-mill facility in Laurens county, thereby creating 360 jobs.

The ICAR research park is providing stimulus to the further growth of the SC automotive cluster. Following in Proterra's footsteps, CT & T, a Korean company is investing \$21 million to manufacture its electric vehicles in Spartanburg county, initially creating 370 new jobs. Notably, the electric vehicle segment is expected to start playing an important contribution, with a predicted market share as high as ten percent by 2020 (Zetsche, 2010). The demand for environmentally friendly vehicles and the uncertainty revolving around the gas prices will drive the demand for the electric vehicles.

As the automotive industry moves towards energy efficient vehicles, clusters focusing on emerging technologies such as in electronics and battery life will fuel the growth of the industry (Mi, 2011). These technological advances will bring down the cost and also provide longer battery life, which is hindering the sales of the electric vehicles. Emerging technologies such as telematics and augmented reality will provide solutions for improving the safety of the automobiles and reduction of accidents (Williams and Balli, 2008).

High innovation companies also bring with them, world class practices that migrate throughout the cluster. BMW is setting new standards in sustainable practices- it became the first automotive manufacturer in SC to get the prestigious ISO 14001 environmental certification in 1998 and almost all of BMW's suppliers are similarly certified. It also created the world's first green automotive paint shop which is powered by recycled methane gas from landfills.

Section V – Conclusion

The South Carolina automotive cluster represents one of the largest and most important players in economic development in South Carolina. This study has provided the first in depth analysis quantifying its total economic impact and highlighting the uniquely important role it plays in South Carolina, especially with regards to employment and employment growth.

Though the automotive manufacturers represent a significant contribution to economic activity in and of themselves, once the additional supplier networks and other establishments that derive part of their business activity from these automotive manufacturers are considered, the South Carolina automotive cluster represents an even greater component of the South Carolina economy in terms of total employment, employment impacts, wages, and total overall contributions to gross state product through value added output.

Specifically, this study finds that the automotive cluster represents 5.4 percent of the state's total employment base, representing approximately 84,935 full-time equivalent jobs. Most importantly, the automotive cluster's ability to scale up employment is better than any other sector in South Carolina; in other words, employment multipliers in the automotive cluster are higher than in any other sector of the state. Of the industry classifications with the highest employment multipliers, the automotive industry represents eight of the top ten, including the top four. The highest multiplier, which is in Military Vehicles Manufacturing, is 5.5; this means that for every job created in this industry, 4.5 additional jobs are created in the South Carolina economy. These multipliers are more than 1.5 times higher than the industry average in South Carolina. In addition, employees in the automotive industry are well paid, with wages approximately 31 percent above the South Carolina industry average. Real annual wages in the automotive industry have been steadily increasing since 1990.

The South Carolina automotive cluster also provides high value added to economic activity. Value added is the most accurate representation of an industry's contribution to the South Carolina economy. The component industries of automotive manufacturing represent the five highest value added multipliers in the state, with the highest multiplier implying that for

every one dollar spent in the automotive cluster, \$2.07 will be generated in additional economic activity (or value added).

Finally, research and development plays an important role in the automotive cluster by helping to attract further automotive manufacturers to South Carolina. Clemson University's International Center for Automotive Research (ICAR) is an important component of this process. Its mission is to set up public-private partnerships and to lead the formation of research centers at ICAR's research facilities. By partnering with companies like BMW, Koyo Bearings USA, and Proterra, ICAR has established a research presence that automotive companies see as a resource. In addition, other companies such as Michelin have started their own research divisions that devote a significant portion of their employees exclusively to innovation and to developing new technology.

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Appendix A: Figures

Figure 1: Establishments Map

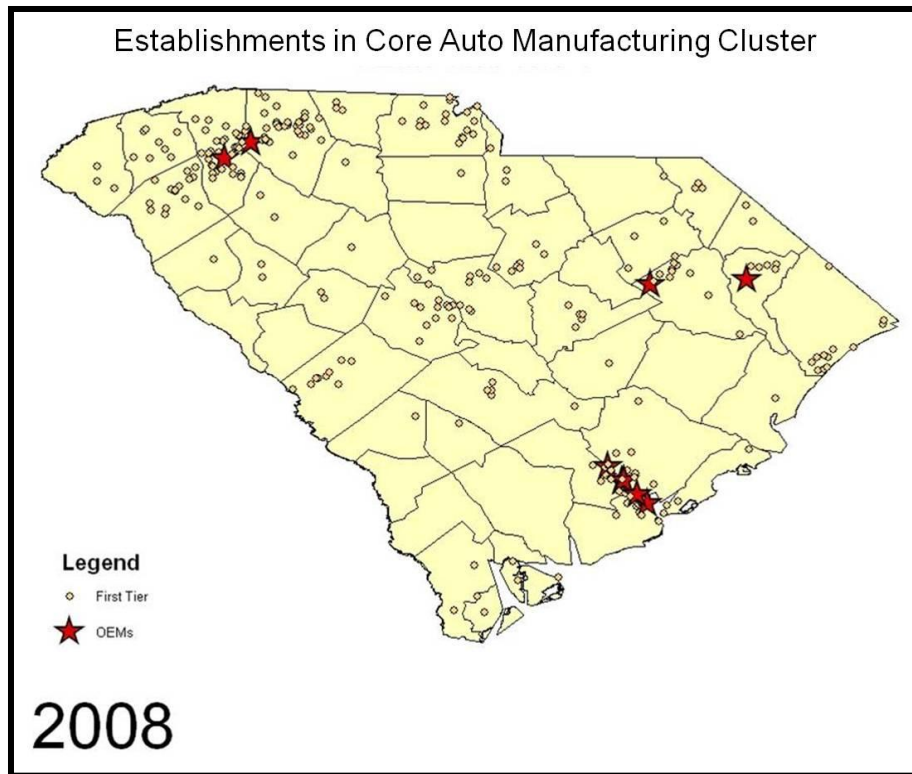


Figure 5: Employment 1999

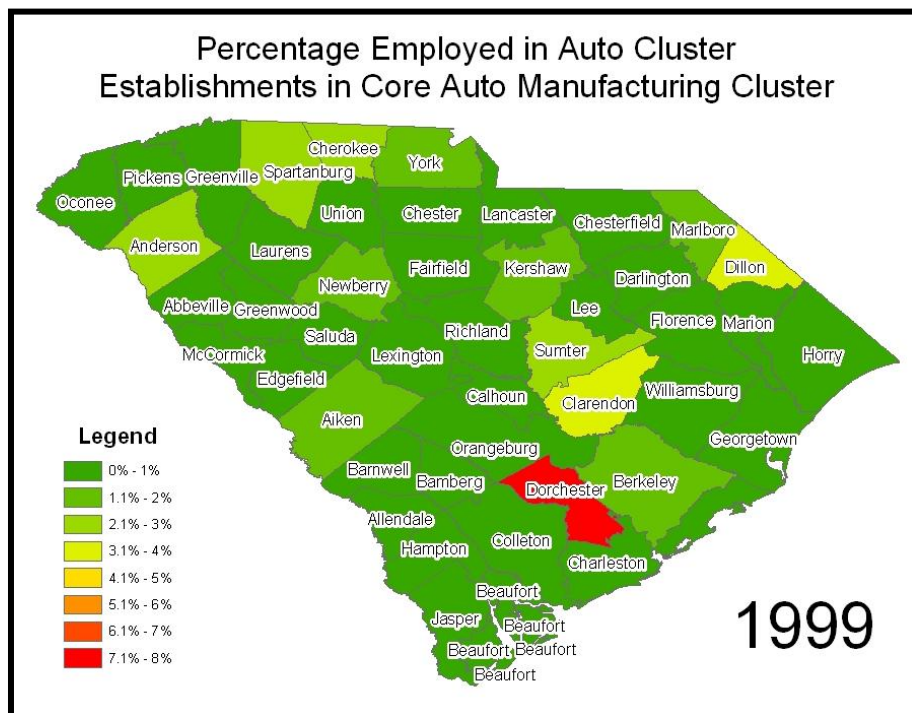


Figure 6: County Employment 1989

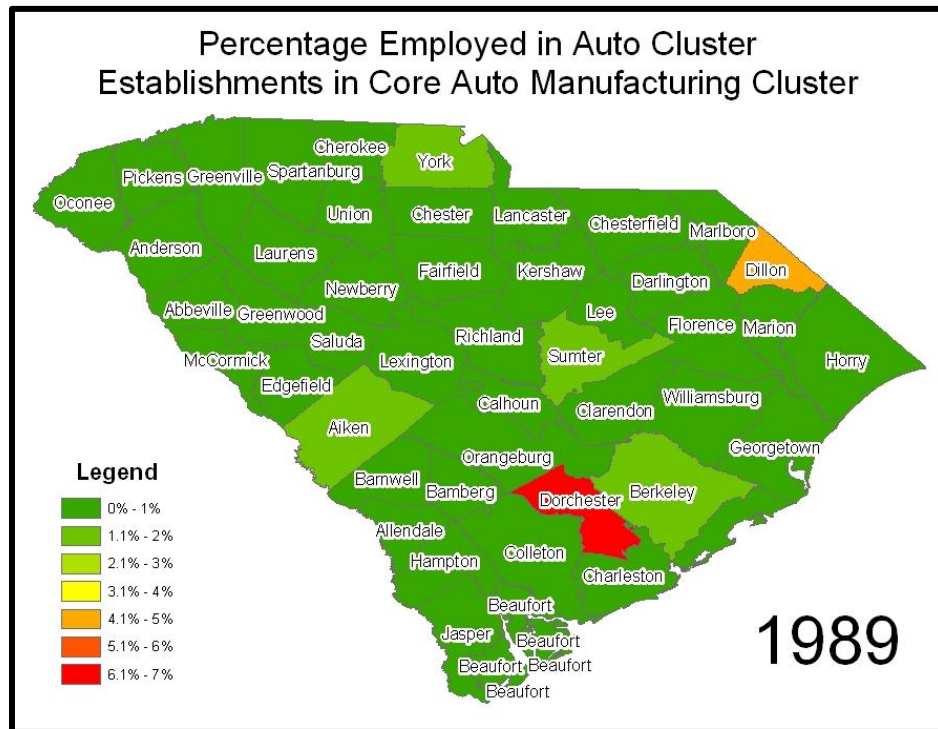


Figure 7: Location Quotients 1989

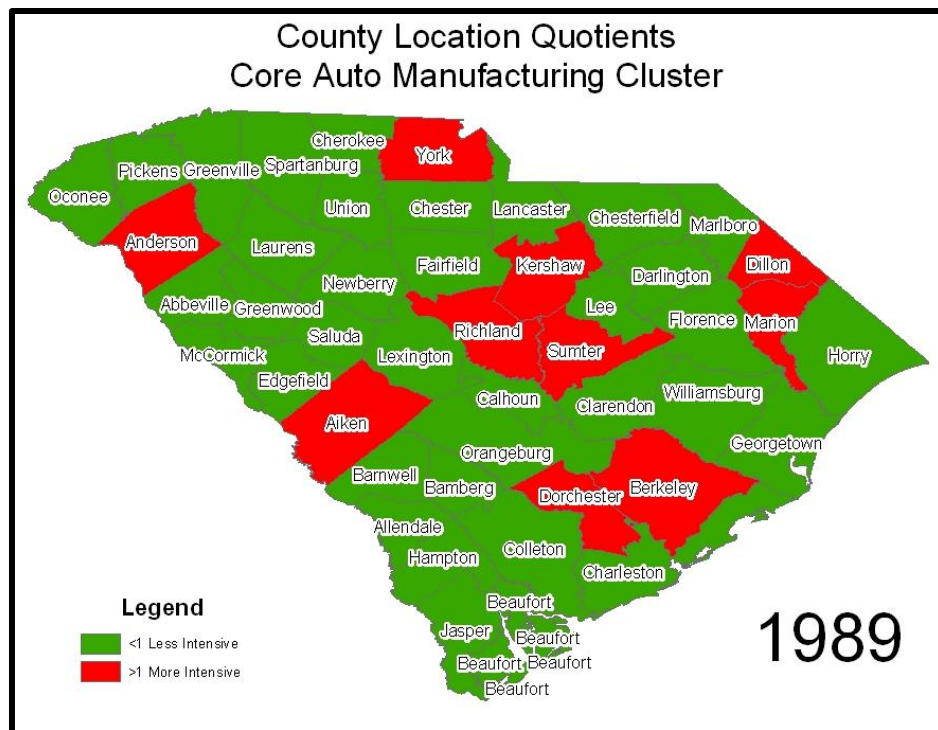
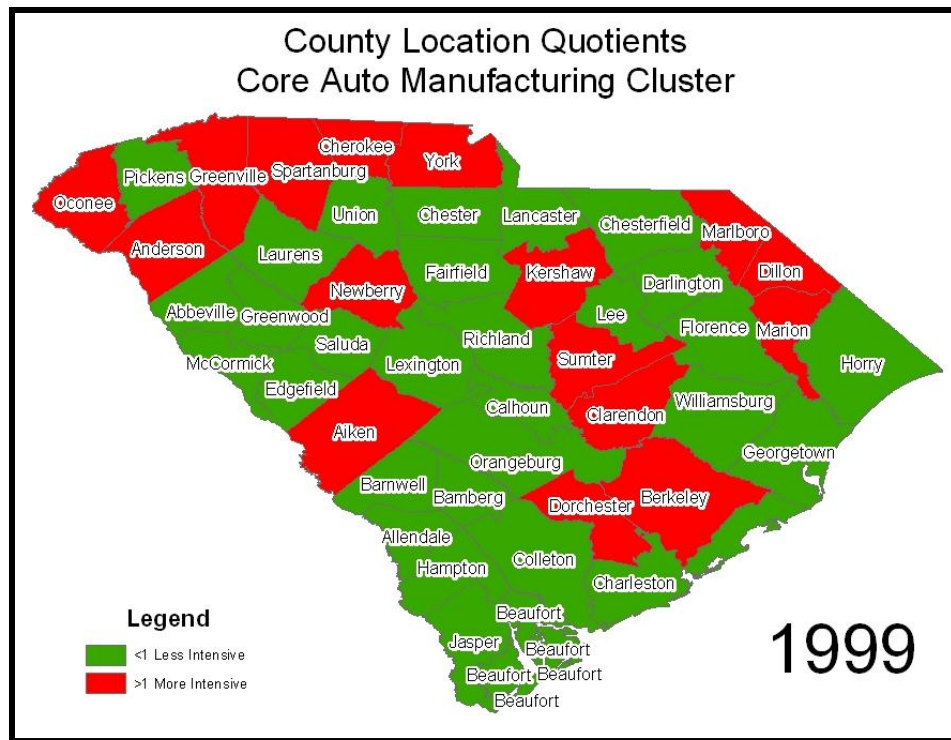


Figure 8: Location Quotients 1999



Appendix B: Tables

Table 1: County Employment and Location Quotients

2008 Core Automotive Manufacturing Cluster					
County	% Employed	Location Quotient	County	% Employed	Location Quotient
Abbeville	0.25%	0.19	Greenwood	0.04%	0.03
Aiken	1.44%	1.12	Hampton	0.00%	0.00
Allendale	0.00%	0.00	Horry	0.06%	0.04
Anderson	3.72%	2.91	Jasper	0.91%	0.71
Bamberg	0.14%	0.11	Kershaw	5.11%	3.99
Barnwell	0.14%	0.11	Lancaster	1.10%	0.86
Beaufort	0.03%	0.02	Laurens	0.02%	0.02
Berkeley	1.09%	0.85	Lee	0.02%	0.02
Calhoun	0.00%	0.00	Lexington	0.36%	0.28
Charleston	1.20%	0.94	Marion	3.99%	3.11
Cherokee	3.86%	3.01	Marlboro	3.12%	2.43
Chester	0.05%	0.04	McCormick	0.00%	0.00
Chesterfield	0.01%	0.01	Newberry	0.76%	0.60
Clarendon	4.10%	3.20	Oconee	0.81%	0.63
Colleton	0.00%	0.00	Orangeburg	1.07%	0.84
Darlington	1.01%	0.79	Pickens	0.09%	0.07
Dillon	4.21%	3.29	Richland	0.19%	0.15
Dorchester	1.37%	1.07	Saluda	0.06%	0.05
Edgefield	0.00%	0.00	Spartanburg	5.43%	4.24
Fairfield	0.00%	0.00	Sumter	0.98%	0.77
Florence	2.40%	1.87	Union	0.02%	0.02
Georgetown	0.03%	0.02	Williamsburg	0.00%	0.00
Greenville	1.08%	0.84	York	1.30%	1.01

Table 5: American Community Survey Wage Data

Year	All Industry Average	Motor Vehicle Body and Trailer Manufacturing	Motor Vehicle Parts Manufacturing
1990	\$ 14,659.65	\$ 17,078.17	\$ 16,710.04
1991	\$ 14,622.49	\$ 16,824.19	\$ 17,290.53
1992	\$ 14,961.37	\$ 16,794.48	\$ 18,410.93
1993	\$ 14,896.00	\$ 16,730.92	\$ 18,525.70
1994	\$ 14,930.00	\$ 16,644.97	\$ 18,990.72
1995	\$ 15,088.30	\$ 17,322.80	\$ 18,916.81
1996	\$ 15,080.52	\$ 18,049.45	\$ 19,660.46
1997	\$ 15,392.00	\$ 18,754.09	\$ 20,362.56
1998	\$ 15,855.66	\$ 18,332.23	\$ 20,532.74
1999	\$ 16,162.51	\$ 18,025.25	\$ 20,867.08
2000	\$ 16,131.99	\$ 17,988.06	\$ 20,530.57
2001	\$ 16,265.07	\$ 18,286.62	\$ 20,499.66

2002	\$ 16,392.67	\$ 18,258.49	\$ 21,492.55
2003	\$ 16,435.33	\$ 19,604.89	\$ 22,186.96
2004	\$ 16,572.62	\$ 19,476.15	\$ 22,812.69
2005	\$ 16,602.91	\$ 21,461.38	\$ 22,570.63
2006	\$ 16,740.76	\$ 21,426.94	\$ 22,543.79
2007	\$ 16,755.97	\$ 24,316.69	\$ 22,266.86
2008	\$ 16,459.23	\$ 26,718.61	\$ 21,951.06
2009	\$ 16,676.38	\$ 32,623.78	\$ 22,010.82

Table 6: County Employment and Sales

2008 Core Auto Manufacturing Cluster					
County	Employment	Sales (Thousands of Dollars)	County	Employment	Sales (Thousands of Dollars)
Abbeville	21	\$3,906	Greenwood	14	\$2,008
Aiken	869	\$101,600	Hampton	0	-
Allendale	0	-	Horry	80	\$5,136
Anderson	2,953	\$452,500	Jasper	85	\$6,569
Bamberg	8	\$734	Kershaw	1,041	\$283,900
Barnwell	14	\$1,083	Lancaster	210	\$55,532
Beaufort	20	\$3,739	Laurens	5	\$385
Berkeley	578	\$98,878	Lee	1	\$54
Calhoun	0	-	Lexington	425	\$56,984
Charleston	2,829	\$835,200	Marion	518	\$93,682
Cherokee	913	\$195,900	Marlboro	289	\$41,220
Chester	6	\$500	McCormick	0	-
Chesterfield	2	\$100	Newberry	120	\$16,584
Clarendon	458	\$78,381	Oconee	238	\$63,045
Colleton	0	-	Orangeburg	405	\$63,583
Darlington	264	\$44,930	Pickens	40	\$2,710
Dillon	455	\$72,350	Richland	533	\$68,578
Dorchester	500	\$174,700	Saluda	4	\$355
Edgefield	0	-	Spartanburg	8,088	\$1,217,200
Fairfield	0	-	Sumter	444	\$145,000
Florence	1,800	\$277,543	Union	2	\$150
Georgetown	9	\$750	Williamsburg	0	-
Greenville	2,908	\$715,379	York	1,119	\$210,900

Appendix C: Definitions and Methods

IMPLAN- Multiplier Analysis	
Motor Vehicle and Equipment Manufacturing comprised of the following IMPLAN sectors:	NAICS Code
Automobile manufacturing	336111
Light truck and utility vehicle manufacturing	336112
Heavy duty truck manufacturing	336120
Motor vehicle body manufacturing	336211
Truck trailer manufacturing	336212
Motor home manufacturing	336213
Travel trailer and camper manufacturing	336214
Motor vehicle parts manufacturing	3363
Military armored vehicle, tank, and tank component manufacturing	336992

Tier Definitions		
Tier	IMPLAN Sector	IMPLAN Name
1	276	Automobile manufacturing
1	277	Light truck and utility vehicle manufacturing
1	278	Heavy duty truck manufacturing
1	279	Motor vehicle body manufacturing
1	280	Truck trailer manufacturing
1	281	Motor home manufacturing
1	282	Travel trailer and camper manufacturing
1	283	Motor vehicle parts manufacturing
1	292	Motorcycle, bicycle, and parts manufacturing
1	294	All other transportation equipment manufacturing
2	75	Fiber, yarn, and thread mills
2	80	Textile and fabric finishing mills
2	82	Carpet and rug mills
2	84	Textile bag and canvas mills
2	85	All other textile product mills
2	95	Sawmills and wood preservation
2	99	Wood windows and doors and millwork
2	100	Wood container and pallet manufacturing
2	105	Paper mills
2	106	Paperboard Mills
2	107	Paperboard container manufacturing
2	113	Printing
2	115	Petroleum refineries
2	119	All other petroleum and coal products manufacturing

2	120	Petrochemical manufacturing
2	121	Industrial gas manufacturing
2	122	Synthetic dye and pigment manufacturing
2	125	All other basic inorganic chemical manufacturing
2	126	Other basic organic chemical manufacturing
2	127	Plastics material and resin manufacturing
2	128	Synthetic rubber manufacturing
2	129	Artificial and synthetic fibers and filaments manufacturing
2	136	Paint and coating manufacturing
2	137	Adhesive manufacturing
2	141	All other chemical product and preparation manufacturing
2	142	Plastics packaging materials and unlaminated film and sheet manufacturing
2	143	Unlaminated plastics profile shape manufacturing
2	147	Urethane and other foam product (except polystyrene) manufacturing
2	149	Other plastics product manufacturing
2	150	Tire manufacturing
2	151	Rubber and plastics hoses and belting manufacturing
2	152	Other rubber product manufacturing
2	155	Clay and nonclay refractory manufacturing
2	156	Flat glass manufacturing
2	157	Other pressed and blown glass and glassware manufacturing
2	159	Glass product manufacturing made of purchased glass
2	170	Iron and steel mills and ferroalloy manufacturing
2	171	Steel product manufacturing from purchased steel
2	172	Alumina refining and primary aluminum production
2	174	Aluminum product manufacturing from purchased aluminum
2	175	Primary smelting and refining of copper
2	177	Copper rolling, drawing, extruding and alloying
2	178	Nonferrous metal rolling, drawing, extruding and alloying
2	179	Ferrous metal foundries
2	180	Nonferrous metal foundries
2	181	All other forging, stamping, and sintering
2	182	Custom roll forming
2	183	Crown and closure manufacturing and metal stamping
2	186	Plate work and fabricated structural product manufacturing
2	187	Ornamental and architectural metal products manufacturing
2	190	Metal can, box, and other metal container (light gauge) manufacturing
2	193	Hardware manufacturing
2	194	Spring and wire product manufacturing
2	195	Machine shops
2	196	Turned product and screw, nut, and bolt manufacturing

2	197	Coating, engraving, heat treating and allied activities
2	198	Valve and fittings other than plumbing
2	200	Ball and roller bearing manufacturing
2	202	Other fabricated metal manufacturing
2	216	Air conditioning, refrigeration, and warm air heating equipment manufacturing
2	218	Metal cutting and forming machine tool manufacturing
2	219	Special tool, die, jig, and fixture manufacturing
2	220	Cutting tool and machine tool accessory manufacturing
2	223	Speed changer, industrial high-speed drive, and gear manufacturing
2	224	Mechanical power transmission equipment manufacturing
2	225	Other engine equipment manufacturing
2	228	Material handling equipment manufacturing
2	233	Fluid power process machinery
2	234	Electronic computer manufacturing
2	236	Computer terminals and other computer peripheral equipment manufacturing
2	240	Audio and video equipment manufacturing
2	242	Bare printed circuit board manufacturing
2	243	Semiconductor and related device manufacturing
2	246	Printed circuit assembly (electronic assembly) manufacturing
2	247	Other electronic component manufacturing
2	250	Automatic environmental control manufacturing
2	252	Totalizing fluid meters and counting devices manufacturing
2	259	Electric lamp bulb and part manufacturing
2	266	Power, distribution, and specialty transformer manufacturing
2	267	Motor and generator manufacturing
2	269	Relay and industrial control manufacturing
2	272	Communication and energy wire and cable manufacturing
2	273	Wiring device manufacturing
2	283	Motor vehicle parts manufacturing
2	289	Railroad rolling stock manufacturing
2	315	Gasket, packing, and sealing device manufacturing